

# Geological Society of Minnesota

Minnesota Geological Survey  
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# NEWS



**Geological Society of Minnesota**

Marcia Gunville, editor  
1110 Gardena Ave.  
Fridley, Minn. 55432

FIRST CLASS

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July, Aug., Sept., 1978

# OFFICERS

PRESIDENT	Mariys Lowe	2206 Caroline Lane, So. St. Paul	451-2822
VICE PRES.	Bob Handschin	2029 Edgerton Road, St. Paul	774-1431
SECRETARY	Mary Kimball	1711 Marshall Ave., St. Paul	644-6429
TREASURER	Bob Leacock	1235 Brighton Sq., New Brighton	636-2473
DIRECTORS	Myrtle Fore	4356 30th Ave. S., Mpls.	722-5650
	Barbara Gudmundson	5505 28th Ave. S., Mpls	722-9132
	Mark Jeffreys	9509 5th Ave. S., Mpls.	888-1274
	Sr. Joan Kain	1035 Summit Ave., St. Paul	225-3000
	Allen Lundgren	765 Redwood Lane, New Brighton	633-5442

"The wonders of the Grand Canyon cannot be adequately represented in symbols of speech, nor by speech itself. The resources of the graphic art are taxed beyond their powers in attempting to portray its features. Language and illustration combined must fail. The elements that unite to make the Grand Canyon the most sublime spectacle in nature are multifarious and exceedingly diverse. The Clysopian forms which result from the sculpture of tempests through ages too long for man to compute, are wrought into endless details, to describe which would be a task equal in magnitude to that of describing the stars of the heavens or the multitudinous beauties of the forest with its traceries of foliage presented by oak and pine and poplar, by beech and linden and hawthorn, by tulip and lily and rose, by fern and moss and lichen. Besides the elements of form, there are elements of color, for here the colors of the heavens are rivaled by the colors of the rocks. The rainbow is not more replete with hues.

But form and color do not exhaust all the divine qualities of the Grand Canyon. It is the land of music. The river thunders in perpetual roar, swelling in floods of music when the storm gods play upon the rocks and fading away in soft and low murmurs when the infinite blue of heaven is unveiled. With the melody of the great tide rising and falling, swelling and vanishing forever, other melodies are heard in the gorges of the lateral canyons, while the waters plunge in the rapids among the rocks or leap in great cataracts. Thus the Grand Canyon is a land of song. Mountains of music swell in the rivers, hills of music billow in the creeks, and meadows of music murmur in the rills that ripple over the rocks. Altogether it is a symphony of multitudinous melodies. All this is the music of waters. The adamant foundations of the earth have been wrought into a sublime harp, upon which the clouds of the heavens play with mighty tempests or with gentle showers.

The glories and the beauties of form, color, and sound unite in the Grand Canyon-- forms unrivaled even by the mountains, colors that vie with sunsets, and sounds that span the dispanse from tempest to tinkling raindrop, from cataract to bubbling fountain. . . . . You cannot see the Grand Canyon in one view, as if it were a changeless spectacle from which a curtain might be lifted, but to see it you have to toil from month to month through its labyrinths. It is a region more difficult to traverse than the Alps or the Himalayas, but if strength and courage are sufficient for the task, by a year's toil a concept of sublimity can be obtained never again to be equaled on the hither side of Paradise."

from "The Exploration of the Colorado River  
and Its Canyons"

John Wesley Powell

# Annual Meeting

The Annual Meeting of the Geological Society of Minnesota will be held on Monday, September 25, at the VIKING VILLAGE SMORGASBORD (27th & Lake St., Mpls. MN.) Dinner through the smorgasbord line will be from 5:30 to 6:45 p.m. The business meeting and program will begin at 7:00 p.m.

The main business before the membership will be voting for approval of the By-Laws, and the election of Directors to the Board. This year's slate of candidates includes four people to be elected to two-year terms. Nominees are:

First Two-Year Term	Second Two-Year Term	One-year term to replace resigning Board Members	Continuing Board Members
Dwight Robinson	Barbara Gudmundson Robert Handschin Marlys Lowe	Pat Wigton Henry Gangl	Myrtle Fore Mark Jefferys Allen Lundgren

## PROGRAM

A special film showing is being arranged for the evening's program. We will present Charlie Matsch's movie "Fire, Water, and Ice", a geologic story of Minnesota. Dr. Matsch, Dept. of Geology, U.M.D., is an "old" friend and exceptional field trip leader of the G.S.M. He has expressed yet another of his many talents in creating this film. He also is the author of the book: "North America and the Great Ice Age". Those of us who have benefitted from Charlie's teaching for so many years are eagerly looking forward to seeing this movie.

Marjorie McGladrey, Membership Chairman, will have a special table set up for the collection of 1979 dues. Although the final deadline for payment is January 1, 1979, it is helpful to her to collect annual dues now. Dues remain the same as last year -- Individual: \$7.00; Husband & Wife: \$10.00; Student: \$2.00.

## NORTHWOODS AUDUBON CENTER TO RECEIVE GIFT FROM G.S.M.

At its last meeting, the Board of Directors voted to show its appreciation to the Northwoods Audubon Center at Sandstone, MN, and to Mike Link, Director/Naturalist, with a gift of \$235.90. This money is designated for the purchase of a Brunton Compass, a Major and a Minor Soil Element Lab, and a pH Soil Lab Test Kit.

The funds for this gift will come from a special savings account designated for the promotion of Geology through educational means. It was the consensus of the Board that Mike Link is in a unique position at the Northwoods Audubon Center to conduct Geological education in a manner which unforgettably impresses his students. Therefore, we know our funds will be used to their greatest extent in this environment.

Many of us have enjoyed the hospitality of the Center for a number of years on numerous field trips and have personally benefitted from Mike's teaching. We are pleased to be able to assist him in acquiring this equipment.

Saturniidae and Continental Drift: A Familial and Generic Survey


by John Luhman, B.S., University of Minnesota

Continental drift has been steadily closing the rifts in knowledge concerning the dispersal of flora and fauna over the continents of the world. More exciting than simply proposing dispersal routes is the possibility of dating these to some extent in geological time. Though there will always be unanswered questions as to how particular groups have evolved and spread, at least it is possible now to delimit the approximate geological ages of such movements. The order Lepidoptera, whose scant fossil record can only be placed at about the Eocene, will greatly benefit from any study of this nature. The Eocene began some 200 million years after the earliest fossil Caddisflies (order Trichoptera) and they are considered most closely related to Lepidoptera through a common ancestor.

It was with these thoughts in mind that I undertook a study of one of the world's favorite moth groups: Saturniidae\*. These are the Giant Silkworm moths which include such elegant beauties as the Cecropia, Luna and Polyphemus moths. Not only is it interesting to see how we came to have these moths in North America, but even more fascinating is how long it must have taken them to attain their present global distribution and finally arrive here. The Saturniids present a good group for a zoogeographical study. They have world-wide distribution, but are represented by relatively few taxa (ranked categories, see\*). Using a conservative classification (Michner's), there are seven subfamilies with over 100 genera comprising about a thousand species and a couple hundred more subspecies. Much has been learned of the range and habits of many of these species over past centuries due to world-wide interest in collecting the beautiful adults and attempts (some partially successful) at sericulture which involves rearing some often bizarre and interesting caterpillars.

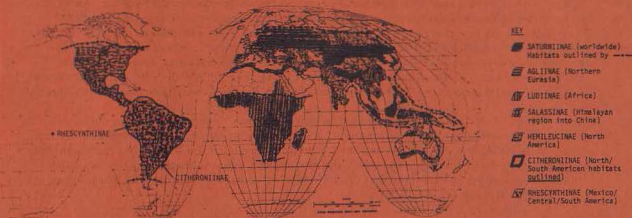
Before summarizing the distribution of the Saturniidae, it is helpful to remember that our above named moths belong to the subfamily Saturniinae\*, with Cecropia in the tribe Attacini, and Polyphemus and Luna in the tribe Saturniini. In compiling the genus and species counts by continent and large islands, approximate percentage distributions become apparent. Half of the Saturniid species exist only in South America with three of four sub-families indigenous there, including the most primitive members of the family. Africa, south of the Sahara, contains about a tenth of the species in two sub-families, one of which is indigenous. Both tribes Saturniini and Attacini of the Saturniinae are present here. India and China with only 3% of the Saturniids have three sub-families, including Saturniinae, plus one indigenous, and one Eurasian sub-family, both of which are relict groups.

Madagascar should also be mentioned here. Although it has perhaps a dozen species, they are in just three tribes of only Saturniinae. Attacini is absent, but Saturniini is present. North America has over 3% of the Giant Silkworm moths though none is indigenous as will be apparent later. Other notable geographic areas include: Japan, Europe (including the British Isles and Scandinavia), Australasia (except New Zealand), and Mexico and Central America. Each of these areas has fewer than a dozen species, with most in the subfamily Saturniinae. The Saturniidae are absent from the Pacific Islands, the West Indies, and New Zealand.

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# SATURNIIDAE

## SUBFAMILY DISTRIBUTIONS



### GOODE BASE MAP SERIES

Department of Geography  
The University of Chicago  
1105 East 58th Street  
Chicago, Illinois 60637

Tabulation of the most primitive characters of the Saturniidae reveals that the subfamilies retaining most of them reside exclusively in South America. Furthermore, the nearest relatives of the Saturniids, the families Oxytenidae and Cercophanidae, are exclusively South American. The evolution of the subfamilies is quite a different matter. One group evolved in Africa, and two relict groups remain in the India-China region. This points to eastern Gondwana (Africa, Madagascar, India) as a significant population site giving rise to perhaps the remaining subfamilies. The Saturniinae are represented throughout these continents. However, some tribal representation is only in Africa and Madagascar. So then, Gondwanaland is the primary center for distribution; all others are secondary.

The fact of continental drift has vastly improved speculation of dispersal routes out of Gondwanaland. The main link between South America and Africa (West and East Gondwana) was lost some 90 million years ago. India-Africa-Madagascar began to separate 100 million years ago and partially completed separation about the Eocene. By the Oligocene the break with Africa was complete since India had collided with Asia by then. During this time South America also drifted into North America.

In the Pleistocene many important land bridges appeared as glaciation lowered sea levels. Now linking this information with the present distribution of the Saturniidae, the following timetable emerges for their spread. They evolve in West Gondwana during the rapid radiation of the angiosperms, their principal larval food and camouflage. The break-up of Gondwana by the Cretaceous isolates several populations and distinct subfamilies become established then.

more



Tribal evolution is established early in the Cenozoic, well before the Oligocene. Genera of tribes in East Gondwana become divided among several continents. With the new links to both Asia and North America, colonization begins with Saturniinae in Asia and Australasia, and North America; some as far as northern South America. Meanwhile, a northern migration occurs from South America. Glaciation in the Pleistocene reduces the range of the new colonizers. New genera and species evolve from isolated populations after the pleistocene. Important to observe here is that the Saturniidae, whatever their particular dispersal routes, must be defined as a family as far back as the Cretaceous in order to appear where they do today. Imagine how much earlier some of the more primitive Lepidoptera may have had their origins!

As a footnote to these observations, we see that our best known representatives of Saturniidae have come to us by means of a circular dispersal: South America through Africa and India, via Northern Asia to North America. Without the aid of the concept of continental drift, such a pattern might never have been untangled. One can infer other floral and faunal information on the basis of continental drift, and I hope that this paper will spur others to do so.

- \* Note on nomenclature: Scientific names are based upon a ranking of common characteristics from very general (Order) to highly specific (Species). These characteristics are presumed to reflect the evolutionary relationships of an organism to its nearest and increasingly distant kin. For example:  
Class (Insects); Order (Lepidoptera: moths and butterflies); Family (Saturniidae); Sub-family (Saturniinae); Tribe (Attacini); Genus (Hyalophora); Species (cecropia).

This then represents the classification and lineage of the well-known Cecropia moth or specifically Hyalophora cecropia. (The species name is never capitalized as historically it was an adjectival description modifying a Latinized noun which began the sentence and hence was capitalized.)

#### References:

- Crotch, W. J.; Silkmooth Rearing's Handbook; 1956.  
CSIRO; Insects of Australia-Supplement; 1975.  
Michner, C. D.; Bulletin of the Museum of American Natural History, "Saturniidae of the Western Hemisphere," 1952.  
Prager, E. M.; Wilson, Osuga, & Feeney; Journal of Molecular Evolution; #8, 1976, pp 283-293.  
Pinhey, E; Emperor Moths of South and South-Central Africa; 1972.  
Seitz; Macro Lepidoptera of the World; all tomes on the Bombycides; 1913-1936.

#### Editor's Note:

John Luhman is currently an adult special at the University of Minnesota studying for his master's degree in Entomology.



# State Fair



Once again our Chairman, Dr. Alex Lowe, and his committee prepared an outstanding display which attracted the interest of many Fairgoers.

Al Hage conceived the exhibit assisted by Dwight Robinson, Don and Betty Wheeler and Barbara Gudmundson helped with the set-up. To those who manned the booth we extend a big THANK YOU !!!

Bob Handschin  
Al & Barb Lundgren  
Dorothy Longfellow  
Irene Carlson  
Eve O'Leary  
Flo Quigley  
Don & Betty Wheeler  
Pat & Ken Brennen  
Earl Fore  
Rod & Peggy Nerdahl  
Pearl Downey

Grace Benz  
Dale Johnson  
Ray Gilles  
Elaine Fink  
Les Collins  
Ethel Shimek  
Dwight Robinson  
Marge McGladrey  
Sister Joan Kain  
Sister Myra Cannon  
Fred Bradford

Vern & Vivian Bloomquist  
Bernadine Riske  
Ann Jaworski  
Charles Howard  
John Snell  
Mary Kimball  
Pat Wigton  
Alex & Marlys Lowe  
Ernest & Donna Stalock  
Al Hage  
N. Balaban

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## GEOLOGY CLASSES OFFERED THROUGH U. OF MN. EXTENSION DIVISION

Once again, the University of Minnesota Extension Division will have a number of course offerings in the field of Geology, including: "Physical Geology"; "Historical Geology"; and "Introduction to Paleontology"

The popular Short Course: "Overview of Modern Geology", will be taught by Professors Calvin Alexander, Robert Sloan, and James Stout. This course will consist of six new lectures; with no lectures being repeated from previous years. Two of its teachers led field trips for the G. S. M. this summer.

Also, a new Short Course: "Geology, Resources, Environment", will consist of six lectures by Professor George Shaw.

J. Merle Harris, who lectured to the G. S. M. in 1977, is again teaching his courses in General College: "Geology of Minnesota's State Parks"; and "Geology of the National Parks".

Senior citizens age 62 and over may register at no cost for any Extension class. For information, call 373-3195. To request a complete Extension Bulletin, call 376-3000.

## WELCOME -----NEW MEMBERS

Mr. E. B. Hurd  
3024 Tilden Street N. W.  
Washington, D. C. 20008

Catherine G. Butler  
713 Fairmount Avenue  
St. Paul, MN 55105

## CHANGE OF ADDRESS

Mr. & Mrs. Clark Pettengill  
1600 Englewood Avenue #110  
St. Paul, MN 55104

William E. Miller  
1375 Simpson Street  
St. Paul, MN 55108

## RESIGNATIONS

Three resignations have been submitted to the Board of Directors:

Bill Miller asked to resign his Board position, and the office of Secretary, effective immediately. Bill gave the Board the happy news that he was being married and had just bought a new house, and felt he needed to cut back on time spent on outside activities.

Mary Kimball was appointed to fill the remaining four months of Bill's term for 1978.

Bob Leacock is planning to move to Arizona sometime next year. Therefore, he asked to be relieved of his Board position - effective December 31; and the office of Treasurer which he has held for three years, to allow another Board member to be elected at this time.

Marcia Gunville, after seven years as Editor of the G. S. M. Newsletter, has asked to be relieved of this position. Recently, she accepted a part-time job with the Minnesota Geological Survey writing materials for the public as well as teaching aids. This, along with her course work in Science at the U. of M. will consume more of her time. However, she has offered to continue as a contributor to the Newsletter.

We wish to extend our thanks and appreciation to these members who gave so much of their time and effort to the Society. May the future hold only success and happiness for them.

## Notice

### WANTED -----EDITOR

With the resignation of Marcia Gunville, our G. S. M. Newsletter Editor, we need someone to fill this important position.

Marlys Lowe, President, is interested in receiving suggestions of persons who would be willing to take on this worthwhile and needed editorship. If you are interested or know of someone who would be, call Marlys at 451-2822.

Also, contributors to the Newsletter are welcome. Any member who wishes to submit an article and/or pertinent announcement for publication is urged to do so.



"The best book to practice mapping North America into your mind . . ."



Warren Hamilton, 1950s

## Natural Regions of the United States and Canada

Charles B. Hunt, The Johns Hopkins University

*Natural Regions of the United States and Canada* takes you on a environmental tour of North America with its generous use of photographs, line drawings, and maps (558 illustrations in all). Charles B. Hunt, an experienced and respected authority, describes in detail the physical environment of the North American continent, Puerto Rico, and Hawaii. Natural regions come alive in terms of their topography, geology, climate, soil, water, plants, and the interrelationship of all these factors.

"Just open this book to an area you already know. Within pages, the land-forms, soils, colors, plants, and importance of your watershed will intensify. An encyclopedia of physiography written in academic style. Lots of maps. Lots of geologic history. The best book to practice mapping North America into your mind."—*Whole Earth Catalog*

1974, 725 pages, 558 illustrations, 22 tables, cloth \$18.50 Special Price \$15.75





## Geological Society of Minnesota

### 1978 - 1979 PUBLIC LECTURE SERIES

133 Physics Building, University of Minnesota, 7:30 p.m.

**P**

September 25      ANNUAL MEETING -- 7:00 p.m.  
Viking Village, 27th & Lake St., Mpls.

**R**

October     9      Dr. Gerald Webers,  
Macalester College,  
will give seven lectures on:

November 13      PLATE TECTONICS AND EARTH HISTORY

**O**

November 27      Recent developments in paleontology  
relative to plate tectonics.

December 11

Labs appropriate to lectures will be held  
at Macalester College on alternate Monday  
evenings.

**G**

January     22

Suggested text for this series:  
Continents Adrift and Continents Aground, by  
Tuzo Wilson; W. H. Freeman, publisher

**R**

February    12

Dr. David Southwick,  
Minnesota Geological Survey,  
will give five lectures on:

February 26

**A**

March       12

THE PRECAMBRIAN:    EVOLUTION OF THE  
CONTINENTAL CRUST

March       26

April        9

**M**

April       23

SPRING BANQUET -- 6:00 p.m.  
(Location to be announced)

# Geological Society of Minnesota

## BACKGROUND INFORMATION FOR THE GEOLOGICAL SOCIETY OF MINNESOTA

THE GEOLOGICAL SOCIETY OF MINNESOTA is an organization interested in the story of the earth, what it is made of and how it is put together. The study of geology, the learning about the earth's past and present history involving billions of years constant change, is fascinating to a large number of people. Members of the Geological Society of Minnesota are such people who want to further their understanding of the processes creating these changes.

LECTURES AND LABORATORY SESSIONS are held on a regular basis during the fall, winter and spring seasons. Generally, an area of study is pursued in depth over several meetings, with presentations being given by professional geologists who either teach on local college campuses or who practice in some other capacity. All lectures are presented on the second and fourth Mondays, October -April at 7:30 p.m. in a room reserved on the University of Minnesota Campus. A discussion period with coffee and refreshments is held during lecture presentation. Also, from time to time selected films are announced and shown. Specimens may be brought to the lectures for examination and identification. Whenever possible, informal laboratory sessions are held on alternate Mondays throughout the lecture series. Announcements concerning them are given at the regular meetings.

FIELD TRIPS fill out the schedule during the summer months. These may be one day tours or more lengthy and elaborate trips. They are led by geology professors or others knowledgeable about the areas being visited. These field trips offer an opportunity to observe first-hand the earth processes forming the landscape and to gain experience at evaluating them.

THE SOCIETY is interested in furthering the understanding of geology by the public with particular emphasis on the geology of Minnesota. It has worked on a number of projects with this aim in mind. Roadside plaques at 33 geologically interesting locations throughout the State of Minnesota have been written and installed under its sponsorship. Exhibits on the State's geology are regularly set up and maintained at the Minnesota State Fair and at Mineral Club shows. Club members have served as speakers to school classrooms and at meetings of local organizations. The efforts of the Society concerning educational projects are ongoing.

MEMBERS OF THE SOCIETY come from all walks of life, and represent all age groups. They need have no particular scientific background, or professional interest to belong to the organization. They are united mainly in their enthusiasm for geology as an absorbing intellectual activity and a stimulating hobby.

THE GEOLOGICAL SOCIETY OF MINNESOTA MEMBERSHIP YEAR begins January 1, with yearly dues payable any time beginning with the fall Annual Meeting. Membership includes subscription to the organization newsletter covering the Society's activities. We invite you to participate.

### MEMBERSHIP CHAIRPERSON

Marjorie McGladrey  
Rt. 1, Box 17 (F)  
Elko MN, 55020  
Phone 461-2676

### MEMBERSHIPS:

Adults .....	\$ 7.00
Husband and Wife .....	\$10.00
Students .....	\$ 2.00